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GOVERNMENTAL ORGANIZED LEARNING AND COORDINATION PROBLEMS: THE CASE OF JAPAN IN THE 1950S

Keywords: coordination, organized learning, governmental agencies, common knowledge base, Japanese development.

JEL codes: D83, H11, L52

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DISCUSSION PAPER 56
ottobre 2000

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Abstract

The effectiveness of the coordinating role of the market through the price-system, and of the State through its intervention policy, depends on the type of information and the knowledge base inherent in the nature of the coordination problems to be solved. Market deficiencies can arise in part from the existence of information asymmetries due to the dispersion of information among decentralized decision units, as in investment decisions. Overcoming these may require not just information flows but also shared knowledge bases, for example to recognize and flag the salience of a particular investment decision for growth. Governmental agencies, as permanent organizations with an ad hoc institutional set-up, can potentially allow the development of such a common knowledge base across organizations, underpinning their coordinating role in the economic system. The paper suggests that such a role helps explain the success of state-inspired industrial recovery in Japan in the 1950s.

1. Introduction

One of the main problems in economic systems is that market-functioning through the price system does not always guarantee the coordination of economic agents essential for achieving intermediate objectives favoring economic growth. The need for coordination concerns several factors affecting economic growth. A relevant example, often considered in the literature, relates to the effects of the lack of coordination in the case of investments. For instance, Wade (1990) observes that investments in one firm may generate by-products or externalities positively affecting other firms; in the form, for instance, of the availability of goods, services and technological capacity. Along with the externalities generated by simultaneous investments, there are also the externalities created by their intertemporal interdependence. Datta-Chaudhuri (1990), referring to pecuniary externalities[1], considers the external-

* I am grateful to Nick von Tunzelmann and Ugurhan Berkok for their remarkable help. Adalgiso Amendola, Paolo Coccorese, Carsten Helm, Atanasios Mitropoulos and the participants in 1999 SABE and in 2000 IAREP/SABE conferences made useful comments.

[1] Scitovsky explains pecuniary externalities in the following terms: “Investments in an industry lead to an expansion of its capacity and may thus lower the prices of its products and raise the prices of the factors used by it. The lowering of product prices benefits the users of these products; the raising of factor prices benefits the suppliers of the factors. When these factors accrue to firms, in the form of profits, they are a pecuniary external economy...” (Scitowsky, 1954: 301).

ities generated by the intertemporal interdependence among firms and industries as ‘a serious impediment to the growth of a backward economy’ in a price-guided system.

An obvious part of the problem consists of maintaining or stepping up information flows among the interdependent firms and industries, but this may not be sufficient where intertemporal issues are involved. The distinction between information and knowledge can be crucial in overcoming market deficiencies in the solution of such coordination problems, which necessitates matching the actions of agents who have a common interest. In this respect a shared body of knowledge provides economic agents with common cognitive tools, essential for a common understanding and representation of coordination problems. In detail, a shared knowledge base is necessary, on the one hand, to individuate coordination problems and their specific features, the economic agents involved, and the set of options available to them, and, on the other, to interpret and frame the problem of choice in a similar way.

In this paper it is argued that governmental organizations can be endowed with a form of corporate knowledge that gives them a cognitive advantage in comparison even with institutionally organized private agents. That cognitive advantage allows governmental agencies to learn and identify coordination problems among the agents concerned. Finally, they can provide better coordination solutions and devise how to coordinate the decision-making of private agents in order to achieve their own goals. It is essential to stress that the development of this corporate-oriented knowledge base of government organizations is made possible firstly by their attribute of being permanent and secondly by their set-up, which can be such as to allow the transmission of information and the consequent accumulation of knowledge.

Finally, in our paper, the Japanese experience during the 1950s is considered as a meaningful example of an articulated ad-hoc institutional set-up, which enhanced information flows within governmental institutions and between the latter and the private economic sector. This helped the evolution of a specific and common knowledge base within Japanese governmental agencies, which contributed to shaping the industrialization policy required to pursue the final goals of the government. The existence of a common knowledge base allowed governmental agencies to play a

coordinating role in the functioning of the economic system during the early stages of advanced industrialization, in particular in regard to investments and related policies.

The structure of the paper is the following. In §2, the role of shared knowledge in the solution of coordination problems will be analyzed, taking as an example the case of investments. In §3 attention will be paid to the heuristic component of knowledge, whereas in §4 the focus will be on how it is possible within organizations to accumulate a common knowledge base related to the solution of coordination problems. In §5 the characteristics of governmental organizations favoring the emergence of this type of knowledge will be considered. Japanese intervention policy in the 1950s will be taken as a significant example in §6 and the conclusions will be drawn in §7.

2. Coordination problems: the case of investments

The analysis of coordination among investment decisions, though considering only the case of investments, helps to emphasize the relevance of coordination related to spillovers and strategic complementarities in the functioning of the economic system. As to spillovers, the benefits to each of the economic agents involved can be affected by changes in the strategy of the others (Cooper and John, 1988); for instance, in the case of simultaneous investments, the greater availability of technological capacity generated by one firm's investment can increase the profitability of the investments of other firms. Strategic complementarities imply that the optimal strategy of each of the agents involved is raised by the increase in the others (*ibid.*). This can happen, for instance, when there are demand linkages and investments in an industry generating pecuniary externalities, which may affect the optimal level of production of other sectors. The latter feeds back into the demand for the products of the former sector. Thus, in this context coordination means matching the actions of agents who have a common interest, which implies that they can get higher benefits by coordinating their own decisions.

2.1 Investments and coordination failure

The coordination problem related to investment-related strategic interdependence can be illustrated by a specific game without pre-play communication, in which a firm A in some industrial sector, by investing, for instance, in a new product, can increase the profitability of the investment in the production of some new commodity of a firm B in another sector. This in turn stimulates the demand for the product of firm A. The latter aspect allows for demand linkages between the firms, which can obtain greater benefits from coordination. The set of strategies available to firm A is (a_1: invest in the new product; a_2: do not invest in the new product), whereas the set of strategies available to firm B is (b_1: invest in the production of the new commodity, b_2: do not invest in the production of the new commodity). Let us consider for simplicity a symmetric payoff matrix, concerning increases in profits, as game α:

FIG. 1 – INVESTMENT COORDINATION

Game a

		FIRM A	
		a_1	a_2
FIRM B	b_1	(1) 10, 10	(2) -8, 0
	b_2	(3) 0,-8	(4) 0, 0

This payoff matrix implies that if both do not invest (payoff 4), their initial conditions will not change, as firm B and firm A by not investing will not get any profit increase. Firm B can increase its profit when it can use the new product made available by the investment of firm A (1), whereas when the new product is not available, it will, for instance, only bear the costs of the investment (2). If firm A invests and the other does not, the demand linkages similarly cause the former to bear only the costs of the investment (3). There are two coordination equilibria ((1), (4)), which are Pareto-ranked. In the game, strategic interdependence makes coordination (1) desirable**.** If one assumes complete information on the payoff function and the strategy space, that they are common knowledge, and that the equilibrium selection criterion excludes the Pareto-dominated outcome, equilibrium (1) prevails.

However, when there is strategic uncertainty concerning the equilibrium selection criterion, it may occur that decision-makers follow the principle of risk dominance (Cooper et al., 1992), according to which 'a secure action is an action whose smallest payoff is at least as large as the smallest payoff to any other feasible action' (Van Huick et al., 1990: 889). This causes a coordination failure, as the evaluation of the riskiness of deciding to invest leads to the inefficient equilibrium outcome (4). The main implication is that, in the case of strategic interdependence, investments may be suboptimal due to a selection criterion that causes a single firm when making investment decisions not to take into account the positive simultaneous effects on other firms.

Hence, in order to overcome the problem of the coordination failure when the description of the game does not suffice to identify focal point equilibria, it is crucial that agents' choice of strategy be based on the beliefs/expectations about their opponents' choice of strategy, underpinned by factors external to such description. Expectations can firstly be based on the exchange of information during pre-play communication. The latter entails that players simultaneously send non-binding messages that they intend to play the risky strategy, which can enhance the emergence of the efficient solution (Cooper et al., 1992). But secondly, expectations can be also underpinned by the salience of the opponents' choice of strategy (Mehta et al., 1994). Salience is characterized by specific features/labels of strategies that are more prominent than others 'by

virtue of analogies or associations of ideas which connect those labels to *common experience, culture or psychology* of the players' (idem: 659, our italics). Thus each decision-maker chooses the strategy whose feature/label she believes most likely to be prominent for her opponents.

In this respect, Van Huick et al. (1990, 1991) underline that salience can concern not only deductive selection principles based on the description of the game, like payoff-dominance or risk-dominance, but also inductive selection principles, based on individuals' past experience. If one considers the iteration of the coordination game, agents can form their expectations and learn how to coordinate by exploiting the information embodying historical precedent. For the selection o\f an equilibrium based on historical precedent to happen, it 'requires decision makers to focus on some salient analogy to a past instance of the present equilibrium selection problem and to expect others to focus on the same analogy' (Van Huick et al., 1991: 892). Thus, one important aspect is that agents share the information concerning the historical experience. This type of information helps coordination by affecting individual expectations and the equilibrium selection criterion, depending on the analogy between the present and past coordination problems. As in the case of investments the iteration of the same coordination game may represent an unlikely event, it seems reasonable to believe that learning from the past concerns the historical precedent of an analogous coordination problem. So one important implication is that the exchange of information among agents can play a considerable role in overcoming coordination failures.

Beyond that, it is important to underline that a shared body not only of information but also of background knowledge helps agents to identify the existing strategic interdependencies and the profit opportunities deriving from exploiting them. Moreover, shared knowledge, by providing an interpretative frame of the functioning of the economic system and by indicating prospects of future higher profit deriving from investment interdependencies enhancing growth, can induce decision-makers to decide to invest and to overcome coordination failures. This implies that a common interpretative background of reference, often embodying past experience, shapes decision-makers' expectations on their opponents'

choice of strategy through the identification of the salience of the efficient solution, and also helps them 'to focus on some salient analogy to a past instance of the present equilibrium selection problem'. This role of knowledge drawn from experience is further developed in the next section.

2.2 Investment strategic interdependencies enhancing economic growth

Another important feature of coordination among investment decisions is that, not only should agents exploit strategic interdependencies, but they should also choose those interdependencies that particularly foster the process of economic growth. This latter aspect of investment strategic interdependence can be illustrated by a game which is such that a firm (A) in some industrial sector has to choose to invest, for instance, in one of three different types of new products. The availability of each product can respectively increase the profitability of the investment in the production of some interdependent new commodity of a firm (B) in another sector. This in turn is assumed to stimulate the demand for the product chosen by firm A. The latter aspect again allows for demand linkages between the firms, which can obtain greater benefits from coordination. The type of strategy available to firm A is a_i: invest in the new product *i* where *i* = 1,2,3; whereas the type of strategy available to firm B is b_i: invest in the production of the interdependent new commodity. It is also hypothesized that the choice of strategy 2 by both players (*i* = 2 and B invests in the relevant interdependent new commodity) fosters the process of economic growth, which will allow for higher gains in the future with respect to the other choices of strategy, though this does not belong to the description of the game. Let us consider for simplicity a symmetric payoff matrix corresponding to a pure coordination game where payoffs again are defined by increases in profits, as in game β:

FIG. 2 – INVESTMENT COORDINATION

Game b

		FIRM A		
		a_1	a_2	a_3
FIRM B	b_1	10, 10	0,0	0,0
	b_2	0,0	<u>10,10</u>	0,0
	b_3	0,0	0,0	10,10

This payoff matrix implies that if both firms invest in the interdependent goods, they will gain an increase in their profits, otherwise the increase will be null. Here the case of complete information on the payoff function and the strategy space is considered - that they are common knowledge. The equality among the payoffs on the diagonal allows focusing on the problem of how individuals acquire equilibrium beliefs by resorting to factors external to the description of the game. This aspect plays a crucial role in this analytical framework. If the payoffs were Pareto-ranked, the principle of payoff dominance would have helped decision-makers to coordinate in order to bring about the efficient solution. The relevant issue in game β though is to understand how individuals can coordinate over strategy 2, which is assumed to trigger economic growth and future greater profits. In this respect it is important that agents' expectations be sustained by the salience of their opponents' choice of strategy (Mehta et al., *idem.*). Interestingly, in

Colman's view, the choice of strategy according to salience can be sustained by a common body of background knowledge and information, which helps agents to interpret/frame the problem of choice in a similar way (Colman, 1997). This leads to the consideration that a shared interpretative frame of reference shapes decision-makers' expectations about their opponents' choice of strategy through the identification of the salient selection criterion. In our specific example, shared knowledge can be such as to provide decision-makers with a broad understanding of the relevant strategic interdependencies among investments and of the growth-oriented strategies. The individuation of the options enhancing growth and development contributes to delineating their future higher profit prospects with respect to the choice of the other strategies. From this perspective, the choice of strategy 2 becomes salient and may prevail over the others. Thus, this type of background knowledge, if shared, induces agents to describe to themselves the available set of options in a similar way (Bacharach and Bernasconi, 1997) and to expect that their opponents' choice of strategy focuses on the salience of strategy 2.

In more detail, drawing heavily on Bacharach and Bernasconi (*idem*) who use Variable Frame Theory, it is hypothesized that each decision-maker can describe the strategies of investing to herself by resorting to the same interpretative frame/background knowledge identifying a family of attributes of the object to choose. Therefore, important components of agents' decision making are:

- The family {F} of attributes of the products in which each firm has to decide to invest, that can be defined as *contribution to growth/higher future profit prospect*. Hence F: {enhancing growth (EG), non-enhancing growth (NEG)}.
- The option set (OS) in which an option corresponds to choosing to invest in one of the products presenting just one of the two attributes; otherwise, if there is more than one product with the same attribute, it corresponds to choosing to invest in a product at random. Hence OS: (choose to invest in the product NEG at random; choose to invest in the product EG; choose to invest in one of the three products at random (PROD)).

These two components transform the matrix of game β in the following way:

FIG. 3 – INVESTMENT COORDINATION

Game g

		FIRM A		
		EG	NEG	PROD
FIRM B	EG	10,10	0,0	1/3(10), 1/3(10)
	NEG	0,0	1/2(10), 1/2(10)	1/3(10), 1/3(10)
	PROD	1/3(10), 1/3(10)	1/3(10), 1/3(10)	1/3(10), 1/3(10)

In game γ, where the strategies have been replaced by the options, the uniqueness of attribute EG allows for the payoff dominance of the corresponding option. Thus, the label belonging to the decision-makers' common framework attached to strategy 2 - the association with EG - helps decision-makers to focus on this option.

The main implication of this analysis is that it is possible to single out a theoretical space where shared knowledge can play a significant role in coordinating investment decisions on the choice of the strategy enhancing growth. The latter can be driven by a body of background knowledge such as to provide decision-makers with the cognitive tools necessary to feature the existing strategic interdependencies along with the benefits derived from exploiting them, and to spot the investment option essential for economic growth. Such knowledge has to be necessarily shared by all the agents involved in the coordination problem, as this as-

sures that each one will focus her expectations about the others' choice of strategy on the same option considered as salient, following the common description of the strategic interaction.

In conclusion, it is possible to single out two aspects related to the solution of coordination problems: the first concerns information exchange among decision-makers in order to overcome coordination failures. More importantly, the second regards the role of a shared body of background knowledge, which initially contributes to identifying the existing strategic interdependencies and the profit opportunities derived from exploiting them. Subsequently, by endowing agents with an interpretative frame of reference this can lead them, on the one hand, to overcome strategic uncertainty and to decide to invest, and on the other to choose those investment options necessary to trigger economic growth.

3. Heuristic knowledge

An important aspect of coordination is related to how individual decision-makers perceive and learn a coordination problem in order to feature it and to draw the benefits from exploiting strategic interdependencies. This implies that individuals have to be able to single a coordination problem out. Once the problem has been individuated, in order to solve it, a crucial role is played by how agents form their expectations on other individuals' behavior and adopt a specific selection criterion in order to coordinate. Both individual learning and decision-making processes can be fostered by exchange of information and the endowment of knowledge inherent in the specific features of coordination among economic agents, which have been little analyzed. In this theoretical framework as previously specified, coordination means matching the actions of agents who have a common interest and the related coordination problems can be caused by a lack of knowledge, which, following the well-known Hayek argument, is due to the fact that knowledge relevant for our decision-making exists only in the form of ‘dispersed bits of incomplete and frequently contradictory

knowledge which all the separate individuals possess' (Hayek, 1945: 519).

Hayek mainly refers to knowledge of 'the particular circumstances of time and place' (*ibid.*), which allows economic agents to pursue the maximization of their objective function and is conveyed through the price system. It is also important to develop more general knowledge, common to the agents involved in coordination and favoring the internalization of externalities in individual choices and, thus, the achievement of collective welfare, which cannot always be obtained through price signals. This type of knowledge can be distinguished as know-what or factual information (Lundvall and Johnson, 1994; Casson, 1997), concerning mainly bits of information on the facts underlying coordination problems; and know-why or conceptual information (Lundvall and Johnson, *idem*; Casson, *idem*) referring to scientific knowledge/ heuristic theories, which in our example can be models of the causal relations allowing the identification of strategic complementarities in the economic system and their impact on economic growth. The main difference of the latter from factual information is that the source of 'concepts and theories' is not direct observation but rather 'reflection upon observations, and the discernment of patterns in them' (Casson, *idem*: 172). It allows identifying the relevant variables in the economic system and a model of the causal links among them. In our analysis, know-why represents the core part of knowledge as it can provide a general analytical framework and a broad view of the economic system functioning which transcends 'the particular circumstances of time and place', and as such is necessary to coordinate investment decisions. The more general the explanatory power of theoretical knowledge, the wider is the span of theory defined by the type and the number of the variables of its observation space, and the extent of the relationships established between the variables (Saviotti, 1996). A relevant aspect of heuristic knowledge so specified is that it can mainly concern permanent features of the coordination problems individuals are dealing with and though specific to the problems can be of interest to a great number and variety of agents in the economic system.

Stemming from the above description, the role of knowledge is that of helping individuals to have a common understanding and

representation of the functioning of the economic system and, thus, to individuate coordination problems and their features, the economic agents involved, and the set of options available to them. In this respect, the shared cognitive tools provided by the knowledge base enhance the matching of behaviors through the emergence of individual expectations that the other agents' choice of strategy will focus on those options considered as salient according to a common interpretation of the external world and a common system of beliefs (Mehta et al., *idem*). Thus, a shared knowledge influences the way decision-makers frame/interpret coordination problems, and eventually allows focusing on efficient solutions considered as salient. This implies that, on the contrary, if economic agents are endowed with a different stock of knowledge related to the problems they are facing, there may be problems of asymmetric or different cognition/ interpretation of the economic system-functioning. In this case, both individuating coordination problems and overcoming them are made more difficult by the lack of a shared knowledge base.

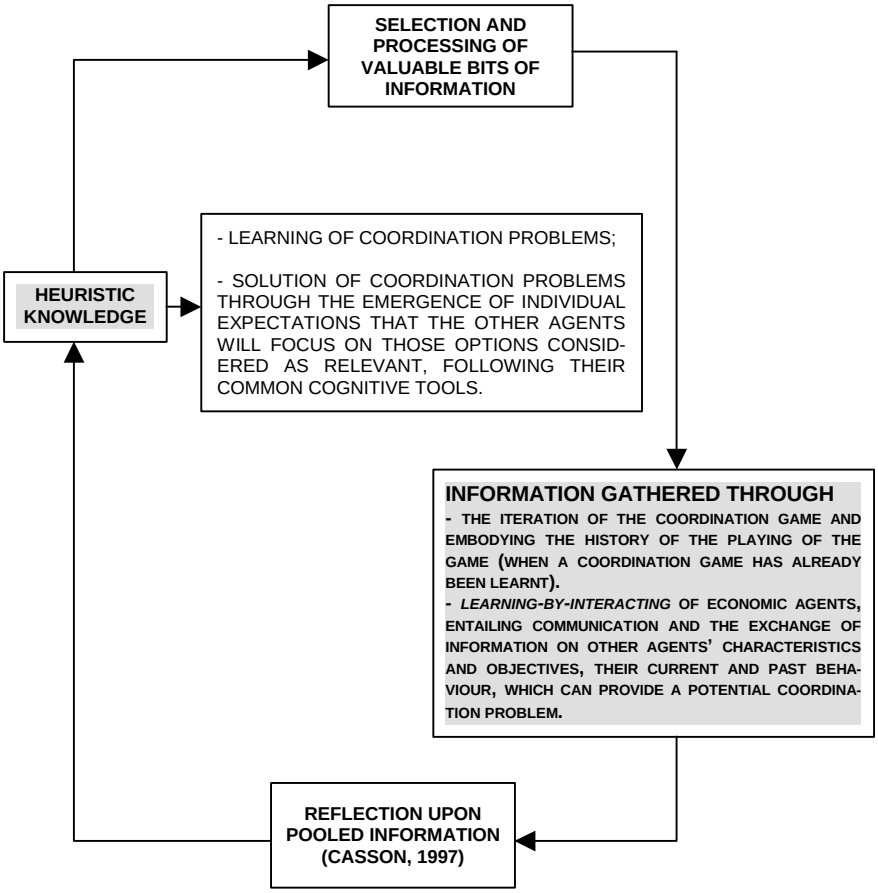
4. Learning and Organizations

Agents can develop knowledge through the iteration of the coordination game concerning either the same coordination problem or an analogous one involving different players, and can learn by exploiting the information embodying the history of the playing of the game when a coordination game has already been identified. More significantly knowledge can be fostered through a process of learning-by-interacting of economic agents, which entails communication and information exchange (pre-play communication). The latter is particularly important as over time it favors the acquisition of information on facts (know-what) such as other agents' characteristics and objectives, their current and past behavior, which can provide a potential coordination problem. Reflection upon pooled information can lead to 'discernment of patterns' in it and to either individuating a model of causal relations/heuristic knowledge or

improving that already existing. Conceptual knowledge in turn can help filter new information gathered during the repetition of agents' interaction related either to the same problem or a similar one. In detail, it allows first identifying and selecting valuable bits of information on other individuals' behavior and on relevant occurrences in the economic system, and subsequently processing and interpreting them in a coherent way. An important implication is that the shared body of knowledge can reduce the costs and the burden of information on agents by reducing the amount to gather and to store on the one hand, and by facilitating its selection and processing. Such a process can contribute to give a better understanding of the causal relations underlying the strategic interdependencies in the economic system and their impact on growth. In fact, new information can shape and improve the conceptual part of knowledge, as agents can learn from their own current and past experience or analogous experience following an inductive process.

This implies adaptive learning underpinned by looking backward, which naturally, relies on individual ability of systematically learning 'from experience – from their own trials-and-errors as well as from observing others – what kind of behavior is more likely to be successful in certain kinds of situations' (Vanberg, 1993:188). Learning from past experience leads not only to the emergence of behavioral routines (*idem*) but also to enriching the individual heuristic framework, which, in our case, is necessary for the definition of a common area of interest and thus of the features of coordination problems. Moreover, learning from the past enhances the solution of coordination, as agents can underpin the expectations about other people's behavior through the improved heuristic knowledge. Perfect information, representing in particular the memory of their own and other agents' past choices, along with complete information, related to the characteristics and needs affecting the payoffs of economic agents, are important elements of know-what and contribute to the emergence and evolution of know-why and of the common knowledge base as a whole. In figure 4 it is sketched how the circuit of knowledge can work and the role of information contributing to its coming out and development.

FIG. 4 – THE CIRCUIT OF KNOWLEDGE



This raises the problem of the lack of information, as the dispersion of the learning process among decentralized decision units along with a wide variety of information may impinge on the acquisition of information bits valuable for learning from past and current experience and for the emergence of a common and consistent

perception and interpretation of the external world. In particular, it can be very difficult and expensive for private agents to gather all the information on the key interdependencies in the economy necessary to coordinate investment decisions. Not only can these two factors – dispersion and variety – make search costs of information unaffordable to agents, but as a consequence can also transform any form of interaction among interested individuals, like communication and information exchange, into an unlikely event. Thus, they may lead to an information-asymmetric distribution, which can be characterized by the lack of complete and/or perfect information, which, as previously argued, count in the emergence of knowledge and thus, in the identification and solution of coordination problems.

In this respect, it can happen that economic agents, though getting higher benefits from coordinating their actions, may not actually meet and communicate. For instance, two industrial sectors can be potentially linked to each other through a strategic complementarity. But each one may ignore the objectives, the characteristics and current needs affecting the payoff function of the other (complete information), and the history of their previous choices along with its own (perfect information). This can lead to neglecting the existence of a coordination problem.

When coordination problems are complex and need long spells of time to be learnt and solved – as often in the case of investments – not only the gathering but also the transmission of the information concerning permanent coordination features, represents a crucial factor. In fact, it makes possible storing the memory of past events and can easily occur if agents move within *permanent* organizational forms to be considered as single learning players, like firms in our example. A relevant feature of organizations is that they are a governance structure defined by "*identifiable boundaries, in which members associate on a regular basis through a set of implicit and explicit agreements, commit themselves to collective actions for the purpose of creating and allocating resources and capabilities by a combination of command and cooperation*"' (emphasis in the text, Ménard, 1995: 172). They are in turn formed by several agents, each active in distinct informational sets from a long-term perspective. Access to different information can also be due to the internal set-up of the organization. It

becomes necessary to transmit the information gathered through either learning-by-interacting with other players or the iteration of an analogous type of coordination problem, from one agent vertically on to those following and horizontally on to those belonging to other sectors of the organization. Information transmission is enhanced if agents move within a permanent organization structured firstly in such a way to allow transmission itself and secondly with a specific objective function.

The former characteristic allows establishing channels for gathering and internally transmitting information, and storing it. Hence, information can be passed on from one agent vertically and/or horizontally within the organization. This makes it possible to store the memory of past experience through the evolution of a common body of knowledge within the organization which helps to feature and to frame a coordination problems. In fact, as already argued, the history of past interactions allows the process of updating its heuristic component and individual expectations.

As to the latter structural characteristic, concerning the objective function, it is crucial to highlight that agents have to have their motivations aligned with the decisions deriving from the objective function of the control sphere, which is sustained by the incentive system of the organization. Moreover individuals recruited in the organization, by *sharing* its common knowledge once it has emerged, are characterized by a common conceptual background, which avoids any misunderstanding in communication through a shared interpretation of transmitted information (Casson, *ibidem*). This guarantees that both the sender and the receiver decode and interpret information bits following the same conceptual tools and the development of a common knowledge base in a consistent way over time. The combination of these two factors fosters both learning and behavioral homogeneity of agents as to the final objective to pursue. Commitment to the goals of the organization through the incentive system also induces individuals to provide information necessary for the development of the shared knowledge, though the latter may present the characteristics of a public good.

If it is possible to overcome the problems related to the dispersion and variety of information which make gathering it for decentralized decision units difficult and expensive, within a perma-

nent organization there may occur the development of a corporate knowledge base. It embodies the memory of the past and sustains a common perception and understanding of the functioning of the economic system, which is crucial both for the identification of coordination problems and their framing, and for the formation of expectations on the actions of the players with whom the organization interacts. Thus, learning through information transmission becomes a corporate experience shared by all the agents involved in the pursuit of the organization objectives. This sheds light on the role of a corporate knowledge base in organizations as governing their collective learning process. The permanent nature of an institutional organization and its structure, seen from this perspective, favors the emergence and a continuous improvement process of the stock of knowledge available to the agents at each stage.

5. The coordinating role of governmental agencies

Can governmental agencies be endowed with knowledge allowing the state to play a coordinating role? The answer to this question can foster an in-depth understanding of state intervention in the economy. Coordination failures of decentralized decision units have often led to the advocacy of government intervention, based on the adoption of a coordinating function allowing the exploitation of strategic interdependencies, as it can provide “a big push, involving simultaneous expansion of several industries” which “can insure profitability of each investment, even though each on its own would be unprofitable” (Wade, *idem*: 353).

The reason why governmental agencies may be endowed with a stock of knowledge necessary to coordinate investments superior to that of private agents even if institutionally organized is crucial. The main characteristic that can make governmental-agency corporate knowledge different from that developed in other forms of organizations derives from the fact that governmental organizations can gather information through *learning by interacting* with a broad variety of agents, ranging from other government agencies

to private economic agents. This occurs because the solution of coordination problems among private agents often represents an intermediate stage in the achievement of the final objectives of governmental agencies. The latter can consequently gain some benefits from playing the role of a 'visible hand' by helping coordination and getting involved in some interaction with economic agents in the private sector. The interaction can encompass not only coordination among the activities of private agents but also coordination between the activities of some private economic sectors and governmental institutions, and making these activities consistent with the final objectives of governmental organizations. Thus, though these agencies can be faced with dispersion and variety of information, they are motivated to widen their observation space with respect to private agents. As to this aspect, in comparison with private agents, the “government may have 'better information' about certain variables because it is a prime agent in their determination and has knowledge of the interactions in the economy as a whole” (Estrin and Holmes, 1983:45). This provides it with a quantitatively and qualitatively rich amount of information, which contributes to developing a knowledge base characterized by a broad and articulated picture of the economic system. The institutional set-up underlying information flows among government agencies and between them and private agents, can be such as to facilitate the access to information and to, accordingly, reduce the costs of gathering it.

It is important to recall that agents within government organizations/civil servants have to have their preferences aligned with the ones of the organization so that they can use the information gathered in the same way and it is possible to develop a consistent body of knowledge. This implies that if the objective function/preferences of the organizations is to further economic growth by fostering coordination, the information extracted and gathered will help the emergence and the improvement of knowledge necessary to pursue this objective. Thus, it is not mistaken to hold that the type of knowledge developed in an organization is correlated to the objective to achieve.

Gathered information can contribute to the knowledge base of governmental agencies as they can be considered as organizations that generally demonstrate the attribute of being permanent

and can be structured in such a way as to allow not only internal information transmission (vertical and horizontal flows) but also transmission between them and private economic agents. These information flows can enhance the development and the updating process described above of a coherent body of knowledge, as quite often agents within governmental agencies are committed to the goals of the organization. Knowledge, on the one hand, improves individual ability to select valuable bits of information, which reduces the burden of information to gather and to store, and, on the other, helps the solution of coordination problems among economic decentralized decision units both at a macro-aggregate and a micro-aggregate level. Therefore, the agents belonging to governmental organizations and endowed with this stock of knowledge can have a cognitive advantage in comparison even with institutionally organized private agents**.** This advantage enables them to enlarge the set of options and unperceived opportunities, and thus to learn and identify coordination problems. Moreover, they may individuate the more suitable coordination solutions and devise how to coordinate the decision-making of private agents in order to achieve their own goals.

In the case of macro-level coordination among investments related to industrialization policies, governmental agencies can use the shared knowledge to underpin their intervention to favor the coordination among firms or industrial sectors. This is because it allows knowing and understanding the history of the economic system and its functioning, and the characteristics of the economic actors involved along with their objectives, which is essential for the pursuit of the intermediate and final goals of the organizations. Thus, if their objective function is based on the pursuit of economic growth through, for instance, coordinating specific types of investments, it is possible to identify the specific coordination problems, to frame them and to find the solution. This can lead to the selection of some industrial sector/s or specific firms and to foreseeing the possible externalities generated by simultaneous investments and by their intertemporal interdependence, and finally to selecting appropriate options and devising how to induce private agents to internalize the externalities in their decision-making process. Significantly, the intervention can be characterized by the provision of knowledge and information as public goods, which economic

agents may need in order to overcome the problems associated with the lack of information. This can generate individual expectations that the choice of the other agents involved in coordination will focus on those options considered as salient according to a common interpretation of the external world consistent with the knowledge and information provided by the governmental organizations. The perception of the expectation consistency influences the coordination of private agents' decision-making, and in the long run the internalization of externalities deriving from investments. Thus, government intervention through its agencies can importantly affect the process of economic growth, as the set-up of these organizations, by favoring the access to and the transmission of information, can develop their own specific corporate knowledge which can further contribute to solving coordination problems and enhancing growth.

6. The case-study of Japan in the 1950s

Japan has often been referred to as an exemplary country where, during the 1950s and '60s, the state with its set of governmental agencies played an important role in the industrialization process without preventing the functioning of market forces. In this respect, the process of Japanese economic growth was characterized by an articulated ad hoc institutional set-up (Johnson, 1983; Okimoto, 1989), which enhanced information flows between governmental agencies and the private economic sector agents.

In the post Second World War period, the priorities of the Japanese government were set in order to achieve economic growth and were based on past historical experience, which helped to gather a popular consensus on the final goal of catching-up economic growth (Johnson, 1982). In this respect, Okimoto (1989) underlines that the dynamic version of the theory of comparative advantages allows understanding the widespread intervention of the Japanese state in the economic system. The main task of Japan from the mid twentieth century to the mid-1970s was

industrialization, in order to catch up and compete with western industrialized countries. The main problem related to this choice were the limited factor endowments in terms of natural resources, capital stock and technology. To foreign observers 'the strategy of concentrating on capital-and technology-intensive industries may seem illogical ... considering the comparative costs of production and Japan's low wage advantages' (*ibid:*22). Accordingly, the natural industrialization path without state intervention, following the prediction of comparative advantage theory, would have been characterized by the adoption of a labor-intensive strategy. But the pressing need of its economic security in the international context induced the Japanese State to adopt an activist role in the industrialization process, choosing sector priorities and shifting resources towards them. Economic security was related to the features of the Japanese economy such as the lack of natural resources, a large population, the need to trade and the constraints of the international balance of payments, partly characterized by the heavy dependency on foreign technology imports, and these affected the path to follow in order to overcome poverty.

During the occupation period (1945-52), one of the main features of the Japanese industrialization policy with the Priority Production Formula was to concentrate the existing scarce resources in some selected strategic sectors like steel, chemicals, textiles, equipment and shipbuilding, in order to recover their production and to start new production. The aim of this intervention was an attempt to substitute natural resource and technology imports by domestic production (Kosai, 1988: 33). In the reconstruction period (1952-1960) the purpose of policy intervention was industrial rationalization to promote exports in order to achieve the loosening of the external constraint by catching up and competing with western countries. The industrial rationalization was based on:

1) ... adoption of new techniques of production, investment in new equipment and facilities, quality control, cost reduction, adoption of new management techniques and the perfection of management control;
2) the rationalization of the environment of enterprises, including land and water transportation and industrial location;
3) ... the creation of a framework for all enterprises in an industry in which each can compete fairly or in which they can cooper-

ate in a cartel-like arrangement of mutual assistance' (Johnson, *idem*: 27)[2].

The intervention policy adopted to loosen the external constraint implied the implementation of a coordinating role of the Japanese government in order to develop an autonomous industrial capacity. For instance, the limits to resource and technology imports implied the internal development of dynamic production complementarities, as the profitability of investments and/or the level of production in an industry were linked to the investments in complementary industries substituting for imports. In this respect, national coal production and investments, with limited imports, affected the profitability of investments in steel, electric power and chemicals, and investments in the steel industry, in turn, substituting for steel imports, were essential both for the level of production and the profitability of investments in the car industry and shipbuilding (Vestal, 1993). Equally, the development of hydroelectric power was necessary for processing carbide, which was a raw material in the production of synthetic fibers (Kosai, *idem*: 37).[3] Thus, in order to develop a competitive advantage with respect to western industrialized countries, it became important to get 'industrial organization right in two senses: firm and inter-firm organization, and sector composition', right sector composition depending 'upon the developments in firm and inter-firm organization elsewhere' (Best, 1990:189). This underpinned the strategic dimension of the coordinating role of Japanese governmental agencies.

The nature of Japanese state intervention led Johnson to characterize it as a 'developmental or plan-rational' state (Johnson, *idem*), in which bureaucrats played a major role, as they had the policymaking or ruling power separated from the reigning power of politicians (Johnson, 1995:29). The power of economic bureaucracy partly rested on 'the recruiting and training of the most intelligent graduates into elite positions, its strategic control over the drafting legislation, its non political character during a very long period of one party rule' (McMillan, 1985: 49). The apolitical character was matched with a strongly goal-oriented behavior

[2] Johnson refers to the definition given by MITI's Industrial Rationalization White Paper.

[3] McMillan (1985:78) holds that "Japan from the 1950s began to substitute domestic coal supplies and hydroelectricity for imported oil."

aimed at the pursuit of economic and technological development, which was strengthened by a low rate of turnover of high level elites (McMillan, *idem*). Goal setting by economic bureaucracy featured indicative planning, one of the components of the high growth system. It was distinguished by the absence of any ideological connotation and was aimed at guiding the industrial activities of Japan, as the priority was given to the long-term specific industrial structure. In addition, the leverages used by bureaucrats were the control of the acquisition and allocation of raw materials and financial resources, including foreign exchange, and energy supplies[4].

6.1 The coordinating role of planning and the government organizational set-up

A relevant aspect of Japanese planning was its function of coordinating the decision-making process, not only among private economic agents but also between the latter and government organizations in charge of the industrialization policy. Coordination was allowed by the organizational set-up underlying the planning activity, which involved (and still does) a continuous communication and exchange of information across government departments and between public-and-private sector companies and governmental organizations. For instance, the members of the Economic Council, an advisory committee in charge of discussing and formulating the economic plan, were representatives of private industrial and business sector, of the academic world, of consumer organizations and labor unions, and often were former bureaucrats. By contrast, the Economic Planning Agency carrying on the planning activity through drafts and documents was the forum where the mediation occurred among the objectives of the different Ministries. In this organizational framework, the government itself 'acted as an effective coordinator of this informational exchange process' (Aoki, 1984: 36). This exchange was based on data analysis taking account of the past history of the Japanese economy and enhancing the capacity to learn from the mistakes of the past (McMillan,

[4] Rationalization cartels were favored as a coordinating device (Best, *ibidem*.).

1985). Data analysis was characterized by the use of inter-industry tables and macroeconometric models (Vestal, *idem*). The result was that planning helped the emergence of a very broad picture of the Japanese economic development and of a policy framework along with a consensus on economic goals, taking into account the specific interests of the agents involved. A by-product of planning was a wide range of publications and white papers on economic issues, which provided the guidelines to private agents when making their choices. These helped the emergence of consistent expectations on quantitative macro variables such as the growth rate (Aoki, *idem*) and qualitative variables, related, for instance, to the type of investment to choose, by allowing the comparison of the past performance of the economic system with the future planned goals.

Industrial plans were elaborated consistently with the general economic plan. As to the elaboration of industrial policy and its specific goals, they were not imposed by the economic bureaucracy but were rather the result of the interaction between private economic actors and government agencies mainly belonging to MITI (the Ministry of International Trade and Industry), mediated by bodies of a consultative nature, formally part of the government. The MITI set-up was structured into vertical bureaus (*genkyoku*), preparing policies for the different industrial sectors and monitoring their performance as to, for instance, demand growth, capacity utilization, factor input costs, productivity performance, market share, import competition and technology. Through this type of environmental scanning it was possible to gather information and build up a high quality statistical base over time (McMillan, *idem*), crucial for any strategic intervention in the economy. At the same time, the horizontal bureaus like the Industrial Policy Bureau dealt with problems cutting across industries, with tasks concerning industrial reorganization, industrial land allocation, provision of raw materials and distribution. The vertical and horizontal bureaus of MITI functioned as ‘a matrix with a great deal of cross-fertilization of ideas, data and strategies, including liaison and coordination with other government ministries’ (McMillan, 1985: 53).

The counterparts in the private sector to the vertical bureaus of MITI were industrial associations grouped in the Japan Federation of Economic Organizations (*Keidanren*), including manufactur-

ing and trading firms, banks and insurance. Their main objective was to put forward their point of view along with their own interests, in their relations with the corresponding *genkyoku*, and thus to shape economic policy. Corporate members, through their association, were informed on government policy goals and their changes. Moreover, these organizations specific to an industry provided governmental agencies with data on production, inventories, shipments and investments, allowing the government to gather information necessary to formulate policy at a very low cost (Vestal, *idem*). Private bodies of a consultative nature, like committees and policy councils (*shingikai*), played a mediation role between private and public interests in the process of policy formation. They were formed by the most senior executives of major corporations, former bureaucrats, a few academics and journalists, and generally had the responsibility of doing research on a variety of economic issues. For instance the Industrial Issues Study Council studied the Japanese industrial structure, the consequences of technological innovation and capital liberalization (McMillan, *idem*). As the research was the result of continuous consultation involving representatives of the business sector, academia and government agencies, its main feature was the provision of a complete picture of the functioning of the economic system. It was based on an in-depth understanding of the private sector and the government decision-making process, and of the Japanese economic standing in the international context.

The organizational framework of Japanese governmental agencies therefore allowed information flows encompassing all the main agents in the economy and fostered the development of a common knowledge base providing an in-depth understanding and a vision of the overall economic system. The latter, in particular, underpinned the guiding role of government through indicative planning and, thus, the coordination between the agencies and private economic actors, and among the latter. It contributed to defining the industrialization policy in order to pursue the goals of the government. Moreover, the information flows between governmental agencies and the private agents, along with the common knowledge base, facilitated the emergence of a consensus on the goals of government organizations and on how to achieve them.

A relevant role in the transmission of information and knowl-

edge were the practices of *amakudari* (the ‘descent from heaven’) and of *yoko-suberi* (sideslip). According to the former, top-rank bureaucrats in the administrative hierarchy, when retiring, could get key positions within the jurisdictional competence of their Ministry in the management of private enterprises and in consultative committees and political organizations. According to the latter, re-employment occurred in public corporations or in entities partly financed from public funds. The transfer of former bureaucrats to private companies implied also the transfer of information and knowledge/expertise, accumulated through their past experience and concerning the bureaucratic decision-making process, the goals of government economic policy as well, and the transfer of their previously developed network contacts. The latter, in particular, allowed for information exchange between the private business sector and government agencies.

The features described above of the institutional set-up fit the definition of Japanese society as a 'network organization' (Kumon, 1992), characterized by an articulated complex of ties among its components. In this type of society, information, its transmission and the regulation of communication, are the crucial elements to reaching consensus on different issues involving the components of society. Following Kumon's view, consensus is obtained through ‘The sharing of information and knowledge - about recognition and evaluation of facts, the setting of goals, and actions to achieve those goals…’ (Kumon, *idem*: 128). The network feature of Japanese society, leading to the consensual nature of the interaction among the components of the networks, affected (and still does) the interaction between the state and its bureaucrats and private economic agents.

Though the effectiveness of Japanese industrialization policy in the form of government direct intervention is still a controversial issue, it is not misleading to hold that the indirect intervention based on the government-guiding role through the provision of information and the overall vision of the Japanese industrial structure and economic system, along with its international standing as public goods, favored coordination of agents' expectations and of their actions in the market-space.

7. Conclusion

The effectiveness of the coordinating role of the market through the price-system, and of the State through its intervention policy, depends on the type of information and the knowledge base inherent in the nature of the coordination problems to be solved. As is often stressed, prices as a coordinating device do not always convey them. In our analytical framework, the set of options and opportunities linked to the existence of spillovers and strategic complementarities concerning investments may go unperceived due to the dispersion of decision units along with a wide variety of information. These factors may hinder the acquisition of bits of information such as other agents' characteristics and objectives, their current and past behavior, which allow learning from past and current experience. This type of information is necessary for the emergence of agents' common perception and interpretation of the external world, which helps coordination; as individuals may have problems of a cognitive nature undermining their ability to identify coordination problems and to form expectations on the other agents' choices of strategy. The failure in exploiting the benefits deriving from coordination can lead either to a suboptimal level of investments, as a single firm when making investment decisions may not consider the positive simultaneous and intertemporal effects on other firms, or not to choose the type of investments fostering economic growth. In this respect, a pertinent question concerns whether the State with its agencies can be endowed with the necessary knowledge base and information to support market functioning. The answer in the paper is that it can, given that governmental agencies as permanent organizations may allow the development of a common knowledge base consistent with their objectives. But this is not sufficient for this to happen, as their internal set-up is a determinant for the gathering and transmission of the information within and among the organizations and for its exchange with the economic agents in the private sector.

In the case of the Japanese government, the organizational set-up was such as to foster continuous information flows within and among the governmental agencies, and between the latter and the consultative bodies in the private sector. Information was

also related to past economic performance, which was essential for the periodic formulation and updating of the economic plans, mainly playing a coordinating role in the economic system. These information flows are held to have contributed to developing a common and specific knowledge, consistent with the pursuit of the final goal of economic growth, within the governmental agencies, in particular MITI. The knowledge base in turn provided a common cognitive framework, which was essential for individuating the coordination problems the Japanese economic system was facing and for converging on specific solutions. The results of this process of information exchange and knowledge accumulation informed the measures adopted, like indicative planning, for implementing the industrialization policy, and most significantly were provided as a public good to private agents in the form of publications and white papers in order to facilitate the coordination among their decisions and the exploitation of the benefits deriving from coordinating.

References

Aoki, M., 1984. Aspects of the Japanese Firm, in: Aoki, M. (Ed.), The Economic Analysis of the Japanese Firm. North Holland, Amsterdam. New York, Oxford, Tokyo, pp. 3-43.

Adams, F.G., Ichimura, S., 1983. Industrial Policy in Japan, in Adams, F.G., Klein, L.R. (Eds.), Industrial policies for growth and competitiveness: An economic Perspective, Massachusetts. Lexington Books, Toronto, pp. 307-323.

Bacharach, M., Bernasconi M., 1997. The Variable Frame Theory of Focal Points: an Experimental Study. Games and Economic Behavior, 19, pp. 1-45.

Bardhan, P., 1990. Introduction to the Symposium on the State and Economic Development. Journal of Economic Perspectives, Summer, Vol. 4., pp. 3-7.

Best, M.H., 1990. The New Competition, Institutions of Industrial Restructuring. Polity Press, Cambridge.

Casson, M., 1997. Information and Organization. A New Perspective on the Theory of the Firm. Clarendon Press, Oxford.

Colman, A. M., 1997. Salience and Focusing in Pure Coordination Games. Journal of Economic Methodology 4 (1), 61-81.

Cooper, R. and John, A., 1988. Coordinating Coordination Failures in Keynesian Models. The Quarterly Journal of Economics 53 (3), 441-463.

Cooper, R., De Jong, D.V., Forsythe, R., Ross, T.W., 1992. Communication in Coordination Games. The Quarterly Journal of Economics 107, 739-771.

Datta-Chaudhuri, M., 1990. Market Failure and Government Failure. Journal of Economic Perspectives, Summer 1990, 4 (3), pp. 25-39.

Estrin, S., Holmes, P., 1983. French Planning in Theory and Practice. George Allen and Unwin, London.

Hayek, F. A., 1945. The Use of Knowledge in Society. The American Economic Review 35(4), 519-30.

Johnson, C., 1982. The MITI and the Japanese Miracle, Stanford University Press.

Johnson, C., 1995. Japan: Who Governs?. W.W. Norton &Company, New York and London.

Kosai, Y., 1988. The Reconstruction Period, in Komya, R., Okuno, M., Suzumura, K. (Eds.), Industrial Policy of Japan, Academic Press, London, pp. 25-47.
Kumon, S., 1992. Japan as a Network Society, in Kumon, S., Rosovsky, H. (Eds.), The Political Economy of Japan, Vol. 3 Stanford University Press, Stanford, pp. 109-141.
Lundvall, B.-Å., 1998. The Learning Economy: Challenges to Economic Theory and Policy, in Nielsen, K., Johnson, B. (Eds.), Institutions and Economic Change. New Perspectives on Markets, Firms and Technology. Elgar, Cheltenham, pp.33-54.
Lundvall, B.-Å.,Johnson, B., 1994. The Learning Economy. Journal of Industry Studies 1(4), 23-42.
McMillan, C.J., 1985. The Japanese industrial system. de Gruyter, Berlin and New York.
Ménard, C., 1995. Markets as Institutions versus Organizations as Markets? Disentangling Some Fundamental Concepts. Journal of Economic Behavior and Organization 28, 161-182.
Mehta, J., Starmer, C., Sugden, R., 1994. The Nature of Salience: An experimental Investigation of Pure Coordination Games. American Economic Review 83(3), 658-673.
Okimoto, D.I., 1989. Between MITI and the Market. Stanford University Press, Stanford.
Saviotti, P.P., 1996. Technological Evolution, Variety and the Economy. Edward Elgar, Cheltenham.
Scitovsky, T., 1958. Two Concepts of External Economies, in A.N Agarwala, S.P., Singh (Eds.), The Economics of Underdevelopment, Oxford University Press, Oxford.
Vanberg, V., 1993. Rational Choice, Rule-Following and Institutions. An Evolutionary Perspective, in Uskali Mäki, Bo Gustafsson, Christian Knudsen (Eds.), Rationality, Institutions and Economic Methodology, Routledge, London, pp. 171-200.
Van Huyck, J.B., Battalio, R.C., Beil, R.O., 1990. Tacit Coordination Games, Strategic Uncertainty, and Coordination Failure. American Economic Review 80(1), 234-248.
1991. Strategic Uncertainty, Equilibrium Selection, and Coordination Failure in Average Opinion Games. Quarterly Journal of Economics, August, 884-910.
Vestal, J.E., 1993. Planning for change: Industrial Policy and Japanese Economic Development, 1945-1990. Clarendon Press, Oxford.

Wade, R., 1990. Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization, Princeton University Press, 1990.

Dipartimento di Scienze Economiche
Università degli Studi di Salerno

Redazione a cura di Gerardo Alfani

Depositato ai sensi di legge